United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:

BA WTR
WR ND
Mail Stop 60189

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228-1807

FEB 27 2007

Memorandum

To: Project Leader, Des Lacs National Wildlife Refuge

From: Chief, Division of Water Resources

Subject: 2006-2007 Annual Water Use Report/Management Plan

The subject report has been reviewed and approved as submitted.

The 2007 Operation Plans for Des Lacs NWR will be forwarded to the North Dakota State Engineer's Office as necessary. Attached is the signed approval page for your files.

Attachment

DES LACS NATIONAL WILDLIFE REFUGE

WATER MANAGEMENT PLAN

2007

Prepared by: Dan Severson **Date:** 30 January 2007
Refuge Manager

Concurrence: Theodore Gutzke **Date:** 31 January 2007
Project Leader

Regional Approval: [signature] **Date:** 2/6/07
Refuge Supervisor

Regional Approval: Richard A Coleman **Date:** 2/8/07
Regional Chief of Refuges

Regional Approval: [signature] **Date:** 2/27/07
Chief, Div of Water Resources

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2006 WATER MANAGEMENT

After thirteen years of above normal precipitation, 2006 was a dry year, with only 14.96" measured compared to the long term average of 16.03". Instead of record amounts of rain in June and July, the wettest months in 2006 were in August and September.

Precipitation for the October 2005-March 2006 winter period was 6.07", well above the normal fall-winter precipitation of 3.93". Total snowfall for the same period was 38.70". We received 12" of wet snow in early October 2005 with near blizzard conditions on October 4-5. It was mostly dry and warm throughout the month other than the storm. We received a total of 2.13" of moisture in October, over double the average October precipitation of 0.94". November was twice as wet as normal (1.13") with wet snow and rain three times during the month. November was also warmer than normal and at the end of the month we were still snow free but frozen. December then turned dry and warmer than normal and at the end of the month we were still snow free but frozen. We received only 0.18" of moisture in December.

We received near average precipitation in January however, with 0.57" of moisture and 5.35" of snow. Temperatures were record breaking warm for January, with the first time in recorded history no temperatures below zero for the month. The high was 52° F on January 14, and the low was 2° F on January 21. There was essentially no snow cover at the end of the month. The warm January was followed by slightly above average precipitation in February, with 0.85" of moisture and 7.80" of snow. Even with the snow mild temperatures melted most of it and we continued to experience little snow cover at the end of the month. The only snow remaining was in the trees and coulees. We then received above average precipitation in March, with 1.21" of moisture and 6.55" of snow received on five days during the month. Warm weather finally arrived the last week of March and water began running on March 30-31, but with very little runoff, only the small coulee dams were receiving water. We received above average precipitation in April, with 1.62" of moisture. The main runoff event was over after the first week of April. Only the small coulee Units 3, 4a and 8 filled to full pool. Unit 6 was almost re-filled and the other units rose slightly. The Upper Lake Units 1 and 2 rose 0.4' and the Middle Lake Unit 4 rose almost 1'. These water levels were still adequate for wildlife and the Lower Lake Unit 7 was allowed to dry out as planned through most of the rest of the year.

We received near average precipitation in May, with 1.81" of moisture, followed by below average precipitation in June of 1.69". Water levels began declining in all the units during this time as evaporation exceeded precipitation. Very good sago pondweed growth was observed in Unit 2, 3, 4, 6, 7 and 8. The hot dry weather continued in July. We received below average precipitation in July, with 0.76" of moisture on six days during the month. Temperatures were above average with the high of 98° F on July 18, and the low was 48° F on July 8. Average temperatures for the month were 87° F for highs and 56° F for lows. This continued to dry up the marshes, with Unit 3 being 90% dry, and mudflats are showing on Units 4, 5, 6 and 7 by the end of July. Excellent growth of sago pondweed continued in all units.

Weather conditions remained abnormally hot in August and September. We received above average precipitation in August, (2.38" of moisture) and September (2.15" of moisture) with temperatures still reaching 90° F as late as September 12. The first frost was 29° F on September 19. The moisture helped replenish the very dry topsoil moisture conditions. As expected with the warm temperatures, water levels continued to decline in major impoundments, with Units 3 and 5 dry, Units 4a and 8 almost dry, and water levels below staff gauges in Units 4, 6 and 7 by the end of September. Almost all small wetlands, dugouts and coulee dams were also dry on the refuge and the surrounding private lands.

October started off warm but turned more normal at the end of the month. We received just slightly below average precipitation in October, with 0.87" of moisture on seven days during the month, with four days of snow, totaling 9.25". The moisture continued to help topsoil moisture conditions. The ground remained unfrozen at the end of October and wetlands continued to dry out. The shallow water in all the units exposed mudflats and shorelines and made good feeding and loafing sites for shorebirds, and excellent conditions for waterfowl feeding on sago pondweed.

November remained unseasonably warm but finally cooled off at the end of the month. We received normal precipitation in November, with 0.55" of moisture. All remaining open water areas finally froze over on November 26. The cold continued into December and then warmed up the rest of the month. We received normal precipitation in December, with 0.50" of moisture on six days during the month, with five days of snow, totaling 7.0". Total precipitation and snowfall for the year are 14.96" and 41.50" respectively. The ground froze hard in early December with a good frost seal and very little snow cover.

Accurate end of year water levels were taken on December 12 after freeze-up utilizing laser levels after mud was frozen allowing easier access.

The drawdowns in the lower marsh units 4a, 5, 6, 7 and 8 were successful as planned. Unit 7 is drawndown to 200 surface acres from full pool of 424 acres. Units 3, 4a, 5, and 6 were dry.

TABLE 1. Climatic Conditions on Des Lacs NWR October 2005-December 2006 measured at Kenmare, ND

MONTH	TEMPERATURES (°F)		PRECIPITATION (inches)		
	HIGH	LOW	SNOW	MOISTURE	AVERAGE MOISTURE
OCTOBER 2005	81	11	12.00	2.13	0.94
NOVEMBER	57	-3	3.25	1.13	0.58
DECEMBER 2005	45	-10	3.75	0.18	0.52
JANUARY 2006	52	2	5.35	0.57	0.64
FEBRUARY	43	-23	7.80	0.85	0.53
MARCH	57	3	6.55	1.21	0.72
APRIL	80	17	0.00	1.62	1.20
MAY	90	33	0.00	1.81	2.07
JUNE	94	44		1.69	3.18
JULY	98	48		0.76	2.33
AUGUST	95	42		2.38	1.86
SEPTEMBER	90	29		2.15	1.62
OCTOBER	76	12	9.25	0.87	0.94
NOVEMBER	63	-13	5.50	0.55	0.58
DECEMBER 2006	39	-18	7.00	0.50	0.52
TOTAL 2006			41.45	14.96	16.03

The emergency spillways in Units 5, 6, 7 and 8 were monitored to determine the effectiveness of chemical spraying (Rodeo) in 2005. Cattails were dead and no additional treatments were needed in 2006.

The new NOAA Climate Reference Network weather station was installed in October 2006 and instantly became operational. The station operates with solar power and transmit data via satellite and is available on the NOAA website. The station is located 20 miles north of Kenmare on the west side of the lake in Unit HB-4.

Gins cleaned out the Unit 6 water control structure in October.

No other major maintenance was required in 2006.

WATER MANAGEMENT PLAN FOR 2007

Prospects for significant runoff in the Spring of 2007 are poor as of late January if normal snowfall is received in February and March. Topsoils were wet in the late fall, and a good deep frost seal is present. Total snowfall from October through January is 23.65" with a normal water quantity of 2.09" of moisture, though there is currently only 3-4"of snow cover. All units may not fill to desired levels, and if little snowfall is received in late winter, conditions will be good to lower water levels in the Upper and Middle Lakes in 2007, which is needed to improve habitat conditions. The main lakes, Units 1, 2, and 4 have not been drawndown significantly since early 1993 during the last drought and need to be lowered to germinate emergent vegetation and to oxidize soils.

The Unit 2 water control structure will be boarded up enough to keep water in Unit 4 from rising and flowing north into Units 2 and 1. All other units south will be held at normal full spring levels except Unit 7, which will again be attempted to keep at a lower than full level. After Units 4, 5 and 6 levels decline, water will be released from Units 1 and 2 to flow south if levels are high enough.

The Unit 3 water control structure will be rehabilitated and modified by contract in late summer of 2007 and the unit will be drawndown beginning in mid-July after nesting is completed to accomplish the work. A coffer dam may be needed in Unit 4 to dry out the downstream side of the structure, and potentially on the upstream side if enough precipitation is received to keep the unit flooded. The outlet stoplog structure will be lowered one foot to allow for more efficient drawdown of the unit when needed in the future. Preliminary engineering drawings and plans have been completed by the end of January.

Water level objectives for 2007 are generally lower than levels specified in the Long Range Water Management Plan which was approved in 1990. All water levels are given in feet above Mean Sea Level (MSL). Units 1and 2 are currently near desired water elevations. All units are expected to rise slightly to moderately during spring runoff and elevations will be determined by how much late winter precipitation in the form of snow is received. It currently is too early to make predictions other than to note that an good deep frost seal is present.

Plans for repairing the Unit 7 water control structure are complete. The project was out for bid in 2000 with no bidders. We were not able to hire a contractor directly to work on the repairs in 2003. Work is needed to repair cracks in the wingwalls, repair spalled concrete and install safety railings over the structure. Work was planned but unable to be completed in fall 2006 due to other commitments by maintenance staff. We may have to install a coffer dam upstream of the structure for de-watering to accomplish the work. We now plan to try to accomplish the work with refuge employees in late fall 2007, water levels and work load permitting.

The Unit 8 Bypass Ditch needs to be cleaned of accumulated silt and some cattails that are beginning to encroach. This work will be done force account with a rented excavator in the summer.

We will continue an active dialogue with the Ward County Water Resources Board in developing a plan to put in a Bypass Channel and associated water control structures that would bypass water around Units 4, 5 and 6 and allow lower water levels to be maintained in Units 1, 2 and 4 as desired under the Long Range Water Management Plan. The Board so far has been willing to commit money to the project if we can store additional water in the spring to alleviate potential downstream flooding where the Des Lacs River dumps into the Souris River near Burlington. We anticipate to work on this project planning which will include compatibility, environmental assessment, public involvement and 404 permitting. The Board will have to come up with the funding to make the project happen if it gets through all the planning and regulatory processes.

Unit 1

The objective levels after spring runoff will be 1782.0. Unit 1 water level froze at 1780.9 in December 2006, almost 1.5' lower than the 1782.3 average for December from 1998-2006 freeze-up levels. Water levels are expected to rise to at least 1782.0 during spring runoff with normal conditions. Lower water levels are desired to encourage emergent vegetation growth on the perimeter of the lake. The water control structure is set to allow excess water to be released into Unit 2 and farther south. The water levels in Unit 1 and Unit 2 will be managed at the same levels and be controlled by the Unit 2 water control structure.

Unit 2

The Des Lacs Long Range Water Management Plan calls for an objective level of 1782.5. The Plan also states that "If this objective is met and exceeded by spring runoff, excess water will be released into Units 4 and 5 and farther downstream in an attempt to meet the objective levels of those pools, and to keep Unit 2 low enough to allow the emergents that have become established to continue to grow". Unit 2 water level froze at 1780.9 in December 2006, just over a foot lower than the 1782.0 average for December from 1998-2006 freeze-up levels. The water and ground levels in Unit 4 continue to restrict flow downstream out of Unit 2. Unit 4 froze at 1781.3 in December 2006. This level is slightly lower than the spring objective level for Unit 2, which we expect to rise after spring runoff to at least 1782.0 due to the frost seal in the area. Unit 4 is likely to rise to the 1783.5 or higher level in the spring of 2007 since we are now able to restrict flow from Unit 4 flowing north into Unit 2, and that has helped to keep Unit 2 water levels lower.

Unit 3

The objective level after spring runoff will be the spillway level of 1787.0. Current level at December 2006 freeze-up was dry. The Unit 3 water control structure low level outlet boards will not be opened until after mid-July when the unit will be dewatered to allow for reconstruction and modification to the water control structure. This unit is expected to easily fill

to spillway levels in the spring. Cattail stands appeared to remain stable in 2006 and do not need to be manipulated yet. The drawdown in 2006 should help with productivity of submergent plants and did not cause an increase in cattail coverage. High spring runoff levels may be keeping the vegetation in check with good nesting conditions available in spring.

Unit 4

The objective level after spring runoff will again be 1783.5. The Unit 4 water control structure boards will be kept open to help with releasing water downstream as necessary. The water level at freeze-up in December 2006 was 1781.28, and the unit showed mudflats around the entire perimeter and received excellent fall waterfowl use. Water will be released into Unit 5 immediately in the spring in an attempt to pass water and fill Unit 6. Water levels are not expected to rise above spring objective levels of 1783.5, and stay well below the emergency spillway level. Fall objective level is 1780.4 and will help to reestablish emergents, and is the bottom level of the outlet, though siltation in front of the structure will likely prevent reaching that level. Based on a survey completed for the Ward County Water Resources Board in 2003, the high point that controls the lowest level that Unit 4 can be drawn down is about 500' south of the structure and is at elevation 1783.75'.

Unit 4A

The objective level after spring runoff will be normal at 1788.4. Generally the unit is filled to the spillway level which is 1788.4. Fall freeze-up in December 2006 had the unit dry. All boards are out of the water control structure and will remain out to pass runoff flows, and then boarded up to capture enough flow to fill the unit to spillway elevation. The structure was cleaned out in late 2005 and will pass adequate water. Peak water level is expected to reach 1788.0 during spring runoff. Water levels will be kept at 1787.0 if possible into the fall as it may be some of the only habitat left.

Unit 4B

No water was pumped in 2006. Low water levels in the spring did not produce any habitat in the unit. No pumping is planned in 2007, and the unit is expected to be most dry with water only in some of the ditches. Marginal habitat will be provided.

Unit 5

The objective level after spring runoff is 1783.5. It is expected that the Unit 5 water control structure boards and gate will remain open all spring to pass water from upstream units. The unit was dry in the fall of 2006. Additional water above 1783.5 will be released into Unit 6. Fall objective level is again 1780.5 or lower. This level may cause potential vegetation problems

as it creates mud flats and increased cattail germination, and the only water left in the unit is in the channel. The water level must be lowered to that level to allow water to drain out of upper Units 1, 2, and 4.

Unit 6

The objective level after spring runoff is 1783.4. The water level at freeze-up in December 2006 was just below the fall target level at 1780.7. This unit is expected to fill to near objective level in spring 2007 and additional water will be passed through the structure or the emergency spillway. Additional spring runoff will be released into Unit 7 and flow is expected to continue during summer to allow release of upstream water. Water levels will again be lowered in the late-fall to about 1781.0. This will create mudflats over about 50% of the unit and may cause increased germination of cattails, if done too early when soil temperatures are high. Lowering of water levels in September and October keeps cattails from germinating. Cattails have been kept at acceptable levels with high water levels, and careful consideration of not lowering water levels too early when temperatures are still high.

Unit 7

Target level for the unit is 1782.0 after spring runoff. Fall freeze-up level was 1777.4, well below the fall target level of 1780.0 as plans to have to hold water back to accommodate J. Clark Salyer changed, and the high temperatures and low precipitation allowed the unit to be lowered primarily by evaporation. Spring 2007 runoff is expected to cause a rise to at least 1780.0. The bypass ditch is expected to run in August until freeze-up to release water. A coffer dam may be constructed to allow for repair of the water control structure in fall 2007. Fall 2007 target level is lower at 1778.0. If runoff is moderate and water levels can be kept lower, emergents are expected to germinate on the north end and margins of the unit. If germination occurs, an attempt will be made to raise water levels during July or August to irrigate the emergent vegetation, with levels again reduced in September and October. No botulism occurred in the unit in 2006, even with low water levels and high temperatures. Botulism may affect late summer water levels and releases.

Unit 8

The objective level after spring runoff will be the spillway level which is 1783.9. Fall freeze-up level was 1781.4, over a foot below normal fall level. Target level is expected to be reached because it is a small unit and spillway is expected to run with elevations of 1784.1 reached for a short time during spring runoff. Water levels below 1783.9 will be determined by evapotranspiration until late fall when levels will be lowered to approximately 1782.0.

DES LACS NWR IMPOUNDMENT DATA

UNIT 1

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1783.0	LOW: 1780.5
JANUARY 31	FROZEN AT 1782.56	
FEBRUARY 28	FROZEN AT 1782.56	
MARCH 31	FROZEN AT 1782.56	
APRIL 24	1783.0	1782.0
MAY 15	1782.7	
JUNE 13	1782.5	1781.5
JULY 4	1782.3	
AUGUST 21	1781.55	
SEPTEMBER 21	1781.1	
OCTOBER 28	1780.9	1780.0
NOVEMBER 28	FROZEN AT 1780.9	
DECEMBER 31	FROZEN AT 1780.9	

HIGH (AFTER SPRING RUNOFF): 1783.0 HIGH FOR YEAR: 1783.0
LOW: 1780.9

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1785.6*
BOTTOM OF OUTLET: 1779.5*

Acre-feet stored as of December 31 14949 AF
Maximum Acre-feet stored at spillway elevation 1785.6 27163 AF
*1999 survey results-changed from previous records

DES LACS NWR IMPOUNDMENT DATA

UNIT 2

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1782.5	LOW: 1780.0
JANUARY 31	FROZEN AT 1782.56	
FEBRUARY 28	FROZEN AT 1782.56	
MARCH 31	FROZEN AT 1782.56	
APRIL 24	1782.90	1782.0
MAY 15	1782.65	
JUNE 13	1782.55	1781.5
JULY 4	1782.2	
AUGUST 21	1781.45	
SEPTEMBER 21	1781.0	
OCTOBER 28	1780.9	1780.0
NOVEMBER 28	FROZEN AT 1780.9	
DECEMBER 31	FROZEN AT 1780.9	

HIGH (AFTER SPRING RUNOFF): 1782.9 HIGH FOR YEAR: 1782.9
LOW: 1780.9

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1789.4*
BOTTOM OF OUTLET: 1778.33*

Acre-feet stored as of December 31 7480 AF
Maximum Acre-feet stored at spillway elevation 1786.2 16614 AF
*2000 New water control structure-change from previous records

DES LACS NWR IMPOUNDMENT DATA

UNIT 3

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1787.0	LOW: 1784.0
JANUARY 31	FROZEN AT 1786.4	
FEBRUARY 28	FROZEN AT 1786.4	
MARCH 29	1787.1 Spilling	
APRIL 3	1787.3 Spilling	1787.0
MAY 15	1786.9	1787.0
JUNE 13	1786.15	
JULY 4	1786.0	1786.0
AUGUST 21	Dry	Dry
SEPTEMBER 28	Dry	Dry
OCTOBER 31	Dry	
NOVEMBER 29	Dry	
DECEMBER 31	Dry	

HIGH (AFTER SPRING RUNOFF): 1787.3 HIGH FOR YEAR: 1787.3
LOW: 1784.0 Dry

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1787.0
BOTTOM OF OUTLET: 1782.0*

Acre-feet stored as of December 31 00 AF
Maximum Acre-feet stored at spillway elevation 1786.96* 99 AF
*1999 survey results-changed from previous records
? Estimate-Area capacity table doesn't go below 1788.0'

DES LACS NWR IMPOUNDMENT DATA

UNIT 4

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1783.5	LOW: 1780.5
JANUARY 31	FROZEN AT 1782.2	
FEBRUARY 28	FROZEN AT 1782.2	
MARCH 30	1783.1	
APRIL 28	1782.92	1783.5
MAY 15	1782.8	
JUNE 13	1782.6	1783.5
JULY 4	1782.16	
AUGUST 21	Below 1782.0	
SEPTEMBER 21	Below 1782.0	1781.5
OCTOBER 31	Below 1782.0	
NOVEMBER 28	Below 1782.0	
DECEMBER 31	FROZEN AT 1781.28	

HIGH (AFTER SPRING RUNOFF): 1783.1 HIGH FOR YEAR: 1783.1
LOW: 1781.28

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1788.5*
BOTTOM OF OUTLET: 1780.4*

Acre-feet stored as of December 31 262 AF
Maximum Acre-feet stored at spillway elevation 1788.5 5649 AF
*1999 survey results-changed from previous records

DES LACS NWR IMPOUNDMENT DATA

UNIT 4A

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1788.4	LOW: 1785.0
JANUARY 31	FROZEN AT 1787.3	
FEBRUARY 28	FROZEN AT 1787.3	
MARCH 31	1788.0	
APRIL 20	1788.42	1788.0
MAY 15	1788.25	
JUNE 13	1787.95	
JULY 4	1787.4	
AUGUST 21	1786.15	
SEPTEMBER 21	1785.34	
OCTOBER 28	Dry	1787.0
NOVEMBER 28	Dry	
DECEMBER 31	Dry	

HIGH (AFTER SPRING RUNOFF): 1788.42 HIGH FOR YEAR 1788.42
LOW: Dry

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1788.4*
BOTTOM OF OUTLET: 1786.6*

Acre-feet stored as of December 31 00 AF
Maximum Acre-feet stored at spillway elevation 1788.4* 47 AF
*1999 survey results-changed from previous records
? Estimate-Area capacity table doesn't go below 1788.0'
**Estimate-gauge does not go that low, removed during work on dike.

DES LACS NWR IMPOUNDMENT DATA

UNIT 5

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1783.5	LOW: 1780.5
JANUARY 31	FROZEN AT 1782.15	
FEBRUARY 28	FROZEN AT 1782.15	
MARCH 31	1782.0	
APRIL 20	1783.16	1783.5
MAY 15	1782.95	1783.5
JUNE 13	1782.65	
JULY 4	1782.36	
AUGUST 21	1781.45	
SEPTEMBER 21	1780.8	1781.5
OCTOBER 28	Dry	1780.5
NOVEMBER 28	Dry	
DECEMBER 31	Dry	

HIGH (AFTER SPRING RUNOFF): 1783.16 HIGH FOR YEAR 1783.16
LOW: Dry

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1784.6*
BOTTOM OF OUTLET: 1779.2*

Acre-feet stored as of December 31 0 AF
Maximum Acre-feet stored at spillway elevation 1784.6* 90 AF
*1999 survey results-changed from previous records

DES LACS NWR IMPOUNDMENT DATA

UNIT 6

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1783.4	LOW: 1780.5
JANUARY 31	FROZEN AT 1781.7	
FEBRUARY 28	FROZEN AT 1781.7	
MARCH 31	1781.7	
APRIL 20	1783.1	1783.4
MAY 30	1782.84	
JUNE 13	1782.6	
JULY 4	1782.35	
AUGUST 21	1781.4	
SEPTEMBER 21	Below 1781.0	1781.5
OCTOBER 28	1780.66	1781.0
NOVEMBER 28	FROZEN AT 1780.66	
DECEMBER 31	FROZEN AT 1780.7	

HIGH (AFTER SPRING RUNOFF): 1783.1 High for the year: 1783.1
LOW: 1780.7

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1783.4*
BOTTOM OF OUTLET: 1777.7*

Acre-feet stored as of December 31 17 AF
Maximum Acre-feet stored at spillway elevation 1783.4* 289 AF
*1999 survey results-changed from previous records

DES LACS NWR IMPOUNDMENT DATA

UNIT 7

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1782.0	LOW: 1780.0
JANUARY 31	FROZEN AT 1778.9	
FEBRUARY 28	FROZEN AT 1778.9	
MARCH 31	1778.9	
APRIL 20	1778.96	1782.0
MAY 15	1778.78	1782.0
JUNE 20	1778.5	
JULY 4	1778.0	1780.0
AUGUST 19	Below 1778.0	1779.0
SEPTEMBER 21	Below 1778.0	1778.5
OCTOBER 31	Below 1778.0	1778.0
NOVEMBER 28	Below 1778.0	
DECEMBER 31	FROZEN AT 1777.4	

HIGH (AFTER SPRING RUNOFF): 1778.96 HIGH FOR YEAR 1778.96
LOW: 1777.4

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1783.9*
BOTTOM OF OUTLET: 1778.5

Acre-feet stored as of December 31 159 AF
Maximum Acre-feet stored at spillway elevation 1783.9* 2556 AF
*1999 survey results-changed from previous records

DES LACS NWR IMPOUNDMENT DATA

UNIT 8

PROGRAM YEAR 2007

WATER SURFACE ELEVATION FOR 2006		PLANNED WATER SURFACE ELEVATION FOR 2007
PLANNED:	HIGH: 1784.0	LOW: 1782.0
JANUARY 31	FROZEN AT 1782.26	
FEBRUARY 28	FROZEN AT 1782.26	
MARCH 28	1782.7	
APRIL 20	1783.3	1784.0
MAY 15	1783.05	
JUNE 13	1782.75	
JULY 4	1782.46	
AUGUST 21	1781.4	
SEPTEMBER 21	1781.0	1782.0
OCTOBER 28	1781.4	
NOVEMBER 28	FROZEN AT 1781.4	
DECEMBER 31	FROZEN AT 1781.4	

HIGH (AFTER SPRING RUNOFF): 1783.3 HIGH FOR YEAR 1783.3
LOW: 1781.0

MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): 1783.9*
BOTTOM OF OUTLET: 1780.0*

Acre-feet stored as of December 31 7 AF
Maximum Acre-feet stored at spillway elevation 1783.9* 127 AF
*1999 survey results-changed from previous records